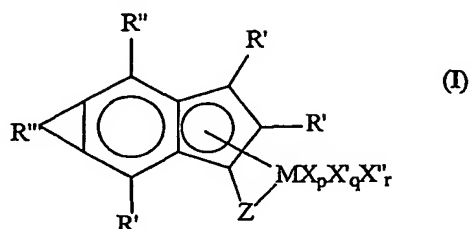


CLAIMS:

1. A metal complex corresponding to the formula (I):



where M is titanium, zirconium or hafnium in the +2, +3 or +4 formal oxidation state;

- 5 R' independently each occurrence is hydride, hydrocarbyl, silyl, germyl, halide, hydrocarbyloxy, hydrocarbylsiloxy, hydrocarbylsilylamino, di(hydrocarbyl)amino, hydrocarbyleneamino, di(hydrocarbyl)phosphino, hydrocarbylene-phosphino, hydrocarbylsulfido, halo-substituted hydrocarbyl, hydrocarbyloxy-substituted hydrocarbyl, silyl-substituted hydrocarbyl, hydrocarbylsiloxy-substituted hydrocarbyl,
- 10 hydrocarbylsilylamino-substituted hydrocarbyl, di(hydrocarbyl)amino-substituted hydrocarbyl, hydrocarbyleneamino-substituted hydrocarbyl, di(hydrocarbyl)phosphino-substituted hydrocarbyl, hydrocarbylene-phosphino-substituted hydrocarbyl, or hydrocarbylsulfido-substituted hydrocarbyl, said R' group having up to 40 nonhydrogen atoms, and optionally two or more of the foregoing groups may together form a divalent
- 15 derivative;

R'' independently each occurrence is a C<sub>6-12</sub> aryl group;

R''' is a divalent hydrocarbylene- or substituted hydrocarbylene group forming a fused system with the remainder of the metal complex, said R''' containing from 1 to 30 nonhydrogen atoms;

- 20 Z is a divalent moiety, or a moiety comprising one  $\sigma$ -bond and a neutral two electron pair able to form a coordinate-covalent bond to M, said Z comprising boron, or a member of Group 14 of the Periodic Table of the Elements, and also comprising nitrogen, phosphorus, sulfur or oxygen;

- 25 X is a monovalent anionic ligand group having up to 60 atoms exclusive of the class of ligands that are cyclic, delocalized,  $\pi$ -bound ligand groups;

X' independently each occurrence is a neutral ligating compound having up to 20 atoms;

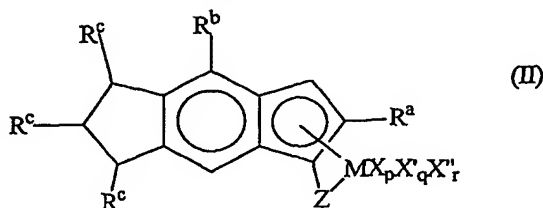
X'' is a divalent anionic ligand group having up to 60 atoms;

p is zero, 1, 2, or 3;

- 30 q is zero, 1 or 2, and

r is zero or 1.

2. The metal complex of claim 1 corresponding to the formula (II):



where M is titanium, zirconium or hafnium in the +2, +3 or +4 formal oxidation state;

R<sup>a</sup> independently each occurrence is hydrogen, C<sub>1-10</sub> alkyl, aralkyl or cycloalkyl, preferably methyl or benzyl;

R<sup>b</sup> is a C<sub>6-12</sub> aryl group;

R<sup>c</sup> independently each occurrence is hydrogen, C<sub>1-6</sub> alkyl, or cycloalkyl, preferably each occurrence R<sup>c</sup> is hydrogen;

Z is a divalent moiety, or a moiety comprising one  $\sigma$ -bond and a neutral two electron pair able to form a coordinate-covalent bond to M, said Z comprising boron, or a member of Group 14 of the Periodic Table of the Elements, and also comprising nitrogen, phosphorus, sulfur or oxygen;

X is a monovalent anionic ligand group having up to 60 atoms exclusive of the class of ligands that are cyclic, delocalized,  $\pi$ -bound ligand groups;

X' independently each occurrence is a neutral ligating compound having up to 20 atoms;

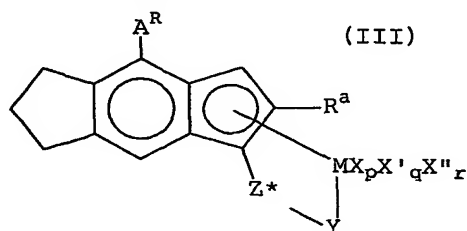
X'' is a divalent anionic ligand group having up to 60 atoms;

p is zero, 1, 2, or 3;

q is zero, 1 or 2, and

r is zero or 1.

3. The metal complex of Claim 2 corresponding to the formula:



wherein:

A<sup>R</sup> is phenyl or naphthalenyl;

R<sup>a</sup> is methyl or benzyl;

M is titanium;

Y is -O-, -S-, -NR<sup>\*</sup>-, -PR<sup>\*</sup>-, -NR<sub>2</sub><sup>\*</sup>, or -PR<sub>2</sub><sup>\*</sup>;

Z<sup>\*</sup> is SiR<sup>\*</sup><sub>2</sub>, CR<sup>\*</sup><sub>2</sub>, SiR<sup>\*</sup><sub>2</sub>SiR<sup>\*</sup><sub>2</sub>, CR<sup>\*</sup><sub>2</sub>CR<sup>\*</sup><sub>2</sub>, CR<sup>\*</sup>=CR<sup>\*</sup>, CR<sup>\*</sup><sub>2</sub>SiR<sup>\*</sup><sub>2</sub>, or GeR<sup>\*</sup><sub>2</sub>;

R<sup>\*</sup> each occurrence is independently hydrogen, or a member selected from  
 5 hydrocarbyl, hydrocarbyloxy, silyl, halogenated alkyl, halogenated aryl, and combinations thereof, said R<sup>\*</sup> having up to 24 non-hydrogen atoms, and optionally, two R<sup>\*</sup> groups from Z (when R<sup>\*</sup> is not hydrogen), or an R<sup>\*</sup> group from Z and an R<sup>\*</sup> group from Y form a ring system;

X, X' and X'' are as previously defined in claim 2;

10 p is 0, 1 or 2;

q is zero or 1; and

r is zero or 1; and

when p is 2, q and r are zero, M is in the +4 formal oxidation state (or M is in the +3 formal oxidation state if Y is -NR<sup>\*</sup><sub>2</sub> or -PR<sup>\*</sup><sub>2</sub>), and X is an anionic ligand selected from the  
 15 group consisting of halide, hydrocarbyl, hydrocarbyloxy, di(hydrocarbyl)amido, di(hydrocarbyl)phosphido, hydrocarbylsulfido, and silyl groups, as well as halo-, di(hydrocarbyl)amino-, hydrocarbyloxy-, and di(hydrocarbyl)phosphino-substituted derivatives thereof, said X group having up to 30 nonhydrogen atoms,

when r is 1, p and q are zero, M is in the +4 formal oxidation state, and X'' is a  
 20 dianionic ligand selected from the group consisting of hydrocarbadiyl, oxyhydrocarbyl, and hydrocarbylenedioxy groups, said X group having up to 30 nonhydrogen atoms,

when p is 1, q and r are zero, M is in the +3 formal oxidation state, and X is a stabilizing anionic ligand group selected from the group consisting of allyl, 2-(N,N-dimethylamino)phenyl, 2-(N,N-dimethylaminomethyl)phenyl, and 2-(N,N-dimethylamino)benzyl, and  
 25

when p and r are zero, q is 1, M is in the +2 formal oxidation state, and X' is a neutral, conjugated or nonconjugated diene, optionally substituted with one or more hydrocarbyl groups, said X' having up to 40 carbon atoms and forming a  $\pi$ -complex with M.

4. The metal complex of claim 3 which is:

30 dichloro[N-(1,1-dimethylethyl)-1,1-dimethyl-[1,2,3,3a,8a- $\eta$ ]-1,5,6,7-tetrahydro-2-methyl-4-phenyl-s-indacen-1-yl]silanaminato(2-)-N] titanium,  
 [N-(1,1-dimethylethyl)-1,1-dimethyl-[1,2,3,3a,8a- $\eta$ ]-1,5,6,7-tetrahydro-2-methyl-4-phenyl-s-indacen-1-yl]silanaminato(2-)-N] titanium dimethyl;  
 dichloro[N-(1,1-dimethylethyl)-1,1-dimethyl-[1,2,3,3a,8a- $\eta$ ]-1,5,6,7-tetrahydro-2-methyl-4-(1-

naphthalenyl)-s-indacen-1-yl]silanaminato(2-)-N] titanium, or  
[N-(1,1-dimethylethyl)-1,1-dimethyl-[1,2,3,3a,8a-η)-1,5,6,7-tetrahydro-2-methyl-4-(1-naphthalenyl)-s-indacen-1-yl]silanaminato(2-)-N] titanium dimethyl.

- 5           5.       A process for the polymerization of olefins comprising contacting one or more olefins under polymerization conditions with a catalyst composition comprising one or more metal complexes of any one of Claims 1-4.

6.       A process according to claim 5 wherein ethylene and one or more C<sub>3-8</sub> α-olefins or styrene and optionally a conjugated or non-conjugated diene are polymerized.